

CLAIMS:

1. A hearing test device comprising:

a testing probe for insertion into an ear canal of a test subject;

a stimuli source for transmitting stimuli into the ear canal;

a receiver for receiving response signals from the ear canal in response to the transmitted stimuli; and

a processor for determining from the response signals whether at least one condition related to the position of the testing probe in the ear canal is satisfied, and for automatically starting a hearing test if the at least one condition is satisfied.
2. The hearing test device of claim 1 wherein the stimuli source comprises two audio speakers, and wherein the receiver comprises a microphone.
3. The hearing test device of claim 2 wherein the stimuli comprise a plurality of pure audio tones.
4. The hearing test device of claim 3 wherein the plurality of pure audio tones are at two alternating frequencies.

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5. The hearing test device of claim 4 wherein the two alternating frequencies comprise approximately 300Hz and approximately 1000 Hz.
6. The hearing test device of claim 1 wherein the at least one condition comprises a temporal stability condition.
7. The hearing test device of claim 6 wherein the temporal stability condition is satisfied when the response signals are consistent in magnitude over a period of time.
8. The hearing test device of claim 7 wherein consistent in magnitude comprises being within approximately 2dB.
9. The hearing test device of claim 1 wherein the at least one condition comprises a spectral response condition.
10. The hearing test device of claim 9 wherein the spectral response condition is satisfied when the difference between at least two of the response signals generated from stimuli at two different frequencies is no greater than a predetermined value, and the average of at least two of the response signals generated from stimuli at a single frequency is within a preselected range.

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11. The hearing test device of claim 10 wherein the predetermined value comprises approximately 25dB.
12. The hearing test device of claim 10 wherein the preselected range is between approximately 32dB and 50dB.
13. The hearing test device of claim 1 wherein the stimuli source comprises first and second audio speakers, each on a separate audio channel.
14. The hearing test device of claim 13 wherein the at least one condition comprises a channel balance condition.
15. The hearing test device of claim 14 wherein the channel balance condition is satisfied when the difference between at least two response signals generated in response to the transmission of at least one stimulus by each of the first and second audio speakers is no greater than a predetermined value for at least one frequency.
16. The hearing test device of claim 1 wherein the at least one condition comprises a plurality of conditions, and wherein the plurality of conditions comprise at least a temporal stability condition, a spectral response condition, and a channel balance condition.

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17. The hearing test device of claim 1 wherein the hearing test comprises a distortion product otoacoustic emissions test.
18. The hearing test device of claim 15 wherein the predetermined value is approximately 4dB.
19. The hearing test device of claim 1 wherein the processor, if the at least one condition is not satisfied, automatically causes the transmission of additional stimuli for re-determining from at least signals responsive to the additional stimuli whether the at least one condition has been satisfied.
20. A method of starting a hearing test, the method employed by a hearing test device having a testing probe positioned in an ear canal of a test subject, the method comprising:
- transmitting a plurality of stimuli into the ear canal;
 - receiving a plurality of response signals from the ear canal in response to the plurality of stimuli;
 - performing, using at least a portion of the plurality of response signals, at least one test related to the position of the testing probe in the ear canal; and

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automatically starting a hearing test if the at least one test is passed.

21. The method of claim 20 wherein the at least one test comprises determining whether the testing probe is stationary in the ear canal.

22. The method of claim 21 wherein the at least one test is passed when the magnitude of the plurality of response signals is consistent over time.

23. The method of claim 22 wherein consistent comprises being within approximately 2dB.

24. The method of claim 20 wherein the at least one test comprises determining whether the testing probe is properly sealed in the ear canal.

25. The method of claim 24 wherein the at least one test is passed when the difference between at least two of the plurality of response signals generated from stimuli at two different frequencies is no greater than a predetermined value.

26. The method of claim 25 wherein the predetermined value is approximately 25dB.

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27. The method of claim 20 wherein the at least one test comprises determining whether the volume of the ear canal is within a predetermined range.

28. The method of claim 27 wherein the at least one test is passed when the average of at least two of the plurality of response signals generated from stimuli at a single frequency is within a predetermined range.

29. The method of claim 28 wherein the predetermined range is between approximately 32dB and 50dB.

30. The method of claim 20 wherein the at least one test comprises determining whether first and second channels are balanced.

31. The method of claim 30 wherein the at least one test is passed when the difference between at least two of the plurality of response signals generated in response to at least one stimulus on each of the first and second channels is no greater than a predetermined value for at least one frequency.

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38. The method of claim 37 wherein the indication is a bar graph.
39. The method of claim 20 further comprising:
- (a) automatically transmitting a further plurality of stimuli into the ear canal if the at least one test is not passed;
 - (b) receiving a further plurality of response signals from the ear canal in response to the further plurality of stimuli;
 - (c) performing, using at least the further plurality of response signals, the at least one test related to the position of the testing in the ear canal;
 - (d) automatically starting a hearing test if the at least one test is satisfied; and
 - (e) repeating steps (a) through (d) if the at least one test is not satisfied.
40. A method of starting a hearing test, the method employed by a hearing test device having a testing probe positioned in an ear canal of a test subject, the method comprising:
- (a) determining whether the testing probe is properly positioned in the ear canal;
 - (b) automatically starting a hearing test if it is determined that the testing probe is properly positioned in the ear canal; and

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(c) automatically repeating steps (a) and (b) if it is determined that the testing probe is not properly positioned in the ear canal.

1. Introduction